U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: *Thymallus arcticus*

COMMON NAME: Fluvial Arctic grayling (distinct population segment of the Upper Missouri River), commonly called Montana Arctic grayling

LEAD REGION: Region 6

INFORMATION CURRENT AS OF: November 2, 2005

STATUS/ACTION:
___ Species assessment - determined we do not have sufficient information on file to support a proposal to list the species and, therefore, it was not elevated to Candidate status
___ New candidate
_X_ Continuing candidate
___ Non-petitioned
_X_ Petitioned - Date petition received: October 9, 1991
___ 90-day positive - FR date:
_X_ 12-month warranted but precluded - FR date: July 25, 1994 (59 FR 37738)
___ Did the petition request a reclassification of a listed species?

FOR PETITIONED CANDIDATE SPECIES:
a) Is listing warranted (if yes, see summary of threats below)? YES
b) To date, has publication of a proposal to list been precluded by other higher priority listing actions? YES
c) If the answer to a. and b. is "yes", provide an explanation of why the action is precluded. We find that the immediate issuance of a proposed rule and timely promulgation of a final rule for this species has been, for the preceding 12 months, and continues to be, precluded by higher priority listing actions (including candidate species with lower LPNs). During the past 12 months, most of our national listing budget has been consumed by work on various listing actions to comply with court orders and court-approved settlement agreements, meeting statutory deadlines for petition findings or listing determinations, emergency listing evaluations and determinations, and essential litigation-related, administrative, and program management tasks. We will continue to monitor the status of this species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures. For information on listing actions taken over the past 12 months, see the discussion of "Progress on Revising the Lists," in the current CNOR which can be viewed on our Internet website >http://endangered.fws.gov/<.
___ Listing priority change
Former LP: ___
New LP: ___
Date when the species first became a Candidate (as currently defined): July 25, 1994
___ Candidate removal: Former LPN: ___

___ A – Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.
___U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.
___ F – Range is no longer a U.S. territory.
___ I – Insufficient information exists on biological vulnerability and threats to support listing.
___ M – Taxon mistakenly included in past notice of review.
___ N – Taxon does not meet the Act's definition of "species."
___ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Fish, Family Salmonidae, Subfamily Thymallinae

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Montana and Wyoming

CURRENT STATES/COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Montana

LAND OWNERSHIP: Fluvial Arctic grayling is currently found in river systems primarily on private lands; however, rivers within the historic range also cross State and Federal (National Park Service, U.S. Forest Service, and Bureau of Land Management) lands.

LEAD REGION CONTACT: Pat Mehlhop, (303) 236-4215

LEAD FIELD OFFICE CONTACT: Doug Peterson, (406) 449-5225, extension 221

BIOLOGICAL INFORMATION

Species Description
Arctic grayling are salmonid fishes having elongate, laterally compressed bodies with deeply forked tails, and adults typically average 254-330 millimeters (10-13 inches) in length. Coloration varies from silvery or iridescent blue and lavender, to dark blue (Behnke 2002). During the spawning period, the colors darken and the males become more brilliant than the females. A prominent morphological feature of Arctic grayling is the sail-like dorsal fin, which is large and vividly colored with rows of orange to bright green spots, and often has an orange border. Dark spots are often evident on the body towards the head (Behnke 2002).

Taxonomy
Arctic grayling (*Thymallus arcticus*) is a fish belonging to the family Salmonidae (salmon, trout, charr, whitefishes), subfamily Thymallinae (graylings), and is represented by a single genus, Thymallus, which contains three other recognized species besides *T. arcticus* (Scott and Crossman 1973; Behnke 2002). The fluvial Arctic grayling, indigenous to the upper Missouri River basin, has likely been isolated from northern grayling stocks for tens of thousands of years

as a consequence of Wisconsin glaciation (Redenbach and Taylor 1999).

Habitat/Life History

Fluvial (river-dwelling) Arctic grayling are adapted to life-long residence in stream environments and make seasonal migrations between spawning, feeding and wintering areas within the river system (Shepard and Oswald 1989). Fluvial Arctic grayling inhabit cool water streams having low-to-intermediate gradients, and prefer pool habitat (Kaya 1990; Byorth and Magee 1998). [Suggest you add something on their food habits] In Montana, they spawn from late April to mid May by depositing adhesive eggs over sand and gravel without excavating a redd or nest (Shepard and Oswald 1989; Kaya 1990). Fluvial Arctic grayling typically reach maturity in their third or fourth year of life. A thorough description of the taxonomy and life history of fluvial Arctic grayling is published in the U.S. Fish and Wildlife Service's (Service) 1994 12-month petition finding (59 FR 37738; July 25, 1994).

Historical Range/Distribution

Historically, the fluvial Arctic grayling was widely but irregularly distributed and locally abundant in the Missouri River headwaters above the Great Falls in Montana into northwest Wyoming within Yellowstone National Park (Vincent 1962). Fluvial Arctic grayling were documented in the drainages of the Sun, Smith, Jefferson, Beaverhead, Big Hole, Madison, Gallatin, Gibbon, and Firehole Rivers; and Grayling, Bridger, Bozeman, and Fan Creeks.

Current Range/Distribution

Presently, the only confirmed self-sustaining remnant of the indigenous fluvial Arctic grayling population in the upper Missouri River basin exists in the Big Hole River in Montana, an area estimated to represent 5 percent or less of the historical range (Kaya 1992a).

Population Estimates/Status

Montana Fish, Wildlife and Parks (MFWP) has monitored fluvial Arctic grayling in the Big Hole River system since 1983. Drought led to curtailed sampling efforts in recent years (2000-02) to avoid capture and handling stress (e.g., Magee and Lamothe 2003), but the best available data indicate a depressed population characterized by sporadic recruitment and a temporally variable age-class composition (Magee and Lamothe 2003, 2004; Magee et al. 2005).

Fluctuating abundance of grayling in the Big Hole River during the period of record is apparently related to stream flow, and persistent drought is the likely a major factor contributing to cause of recent population declines. Recent surveys indicate significant variability in age composition related presumably to spawning success and cohort strength. Poor recruitment during 1999-2002 resulted in a population skewed toward older individuals (Magee and Lamothe 2003, 2004). However, strong recruitment in 2003 (Magee and Lamothe 2004) and fair recruitment in 2004 (Magee et al. 2005), coupled with mortality of older individuals, has shifted the composition toward younger age classes (Figure 1). Absolute numbers (i.e., abundance) of adult grayling have apparently declined. For example, spring 2002 spawning surveys in the mainstem Big Hole River captured the lowest number of grayling in the past 14 years (Magee and Lamothe 2003), and age-3 and older (adult) grayling abundance in fall 2003 and 2004 remained at low levels (Magee and Lamothe 2004; Magee et al. 2005). Abundance of age-1 and older grayling at one of MFWP's "traditional" sampling locations (i.e., index sites) has declined

in recent years (Table 1); however, the overall distribution of age-1 individuals in 2004 apparently increased (Magee et al. 2005) presumably because of the strong reproduction and recruitment in 2003 and subsequent dispersal.

Index sites in the Big Hole River have typically focused on fluvial Arctic grayling abundance in mainstem location (e.g., Wisdom – see Table 1; Figure 2), but recent survey data suggests tributary streams also should be explicitly considered when determining the status of grayling in the watershed. For example, 2003 and 2004 snorkel and electrofishing surveys have confirmed that grayling utilize reaches of Deep, Seymour, Lamarche, Fishtrap, Swamp, and Steel Creeks (Magee and Lamothe 2004; Magee et al. 2005; Jim Magee, MFWP, unpublished data). In some cases, fluvial Arctic grayling exist at comparatively high densities (e.g., in Lamarche Creek grayling densities were 87 age-1+ per mile (std. dev. 6) and 89 cumulative all age classes per mile (std. dev. 32) in 2002 and 2004, respectively; Magee and Lamothe 2003; Magee et al. 2005) and included multiple age classes (e.g., age-0, juveniles, and adults in Fishtrap and Lamarche Creeks during 2003-2004: Magee and Lamothe 2004; Jim Magee, MFWP, unpublished data). Grayling also were observed in Wise River and Odell Creek during 2003, but may represent individuals that migrated from downstream from mountain lakes (P. Magee, MFWP, unpublished data).

Tributary use by grayling in the Big Hole River watershed is well established (e.g., Liknes 1981; Magee and Lamothe 2003, 2004; Magee et al. 2005), but uncertainty about the extent of such use indicates the landscape-level population structure of grayling is not precisely understood. Plausible hypotheses for grayling presence in tributaries run along the continuum from true residency (complete life cycle in tributary) to seasonal or periodic utilization based on specific life history requirements such as refugia (e.g., thermal stress, dewatering), rearing and feeding, and spawning. An assessment of the contribution of tributary streams to grayling abundance and persistence in the system is warranted.

The Service and MFWP (MFWP and Service, in litt. 1996) signed an agreement (MFWP/USFWS agreement) recognizing the Fluvial Arctic Grayling Restoration Plan as the conservation strategy that will guide restoration and monitoring for the fluvial Arctic grayling. This agreement identifies quantitative population parameters (densities and population age structure) for the remnant population in the Big Hole River. These thresholds are--A) the age-1 and older grayling density estimate based on fall surveys in the McDowell-Wisdom section of the Big Hole River must meet or exceed 30 grayling per mile; and B) the total percentage of age-1 and -2 grayling captured during combined spring and fall surveys must constitute between 50-80 percent of the total population sampled (excluding age-0 grayling). [Clarification needed – what is meant by “quantitative population parameters” and “thresholds” – are these goals that indicate whether restoration/conservation of the species is going to be considered “successful”? Are these thresholds that somehow relate to our listing determination? Careful wording is needed since the thresholds could be confused with our basis for a listing determination, i.e. we decide based on threats in relation to life history, status, and distribution of the species, not on the basis of thresholds.]

Because drought curtailed sampling in 2000 and 2001, data were insufficient to determine if the thresholds were met. Data from 2002 indicated that the thresholds were not met (Magee and

Lamothe 2003). Grayling abundance was presumed to fall below the minimum density threshold because too few grayling were captured to generate a mark-recapture abundance estimate (i.e., "recapture" sampling was not conducted because of low numbers of grayling captured during "mark" sampling, so the estimate could not be calculated). Age-1 and -2 grayling comprised about 46 percent of the total sample of age-1 and older grayling. "Abundance" data from 2003 were presented as raw numbers captured or catch-per-unit effort (CPUE) (Magee and Lamothe 2003) so it is not possible to evaluate the data in relation to the density threshold. However, age-1 and age-2 grayling represented about 58 percent of the age-1 and older grayling sampled (i.e., met one of the two agreement parameters). Data from 2004 (see Magee et al. 2005) are insufficient to determine if they meet the existing threshold values because--(a) spring sampling was curtailed because of low streamflows and biologist effort was re-prioritized to secure instream flows, and (b) data from 2004 were presented as CPUE (see Figure 2) and no relationship between historical density estimates and CPUE values was provided.

The Arctic grayling population in the Madison River-Ennis Reservoir, putatively part of the fluvial DPS including the Big Hole River, persists at very low levels. Only 19 adult grayling were captured in the Madison River upstream from Ennis Reservoir during 7 days of electrofishing in 2004, and no young-of-the-year grayling were encountered in a 1-day survey of historical spawning and rearing habitats in 2005 (P. Clancey, MFWP, Ennis, Montana, pers. comm.).

Because time frames identified within the agreement for reestablishment criteria have now passed, MFWP is currently revising the agreement and anticipates presenting a draft to the Fluvial Arctic Grayling Workgroup (Workgroup) in spring 2006. The Service anticipates this revision will review the existing monitoring design, consider the information gleaned from past reintroduction attempts, and identify data gaps that must be filled so that more progress can be made toward securing and expanding fluvial Arctic grayling populations in the upper Missouri River basin.

The existing dataset does not permit a rigorous statistical analysis of population trends for fluvial Arctic grayling in the Big Hole River. However, the weight of evidence indicates an at-risk population. Monitoring a population of rare animals, such as grayling in this case, is inherently difficult. Thus, an occasional lack of population estimates or imprecise population estimates at index sites might be expected (see Table 1). Recent grayling population monitoring data for the Big Hole River are presented as CPUE or raw numbers captured (Figures 1 and 2). However, a relationship between CPUE index values and abundance (i.e., density based on mark-recapture) has not been established, such that the information in Figure 2 and Table 1 are not directly comparable at this time. An additional caveat is that perceived fluctuations in abundance at index sites might be confounded by the migratory characteristics of grayling. Population monitoring which relies on a few discrete index sites can be problematic given potential inter-annual variation of grayling distribution in response to changing flow regimes (e.g., Blackman and Hunter 2001; Blackman 2002). Statistical difficulties and potential effects of migratory behavior aside, the available data for Big Hole River fluvial Arctic grayling are nonetheless consistent with a declining population (low abundance) characterized by inconsistent recruitment (skewed age structure). Arctic grayling resident in the Ennis Reservoir section of the Madison River (putatively part of the fluvial DPS) are present at very low

abundance and at risk of extirpation. Moreover, the fluvial Arctic grayling are believed extirpated from approximately 95 percent of their historic range in the upper Missouri River basin (Kaya 1992a).

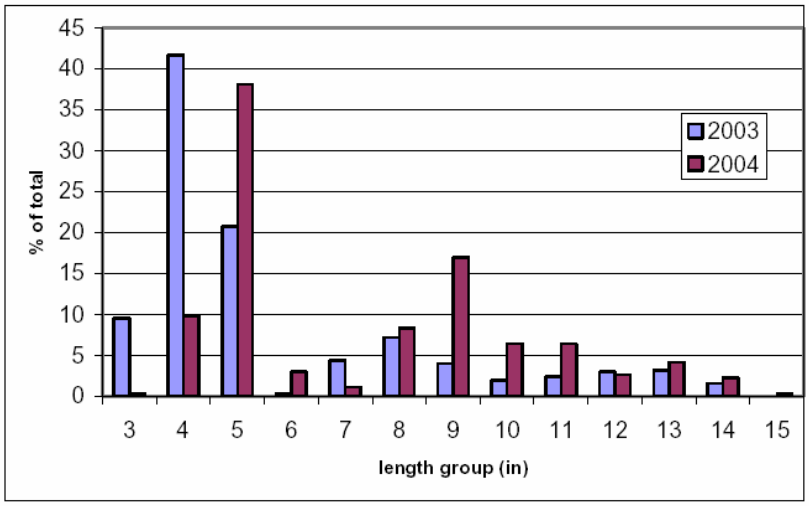

Figure 1. Length-frequency histogram depicting fluvial Arctic grayling captured by MFWP in 2003 and 2004 fall electrofishing surveys in the Big Hole River, Montana. Total number of grayling captured in 2003 and 2004 were n=502 and n=265, respectively. Age-0 (young-of-the-year) grayling approximately ≤ 6 inches long composed approximately 70 percent (in 2003) and 53 percent (in 2004) of the total capture (Magee and Lamothe 2004; Magee et al. 2005). Figure adapted from Magee et al. (2005).

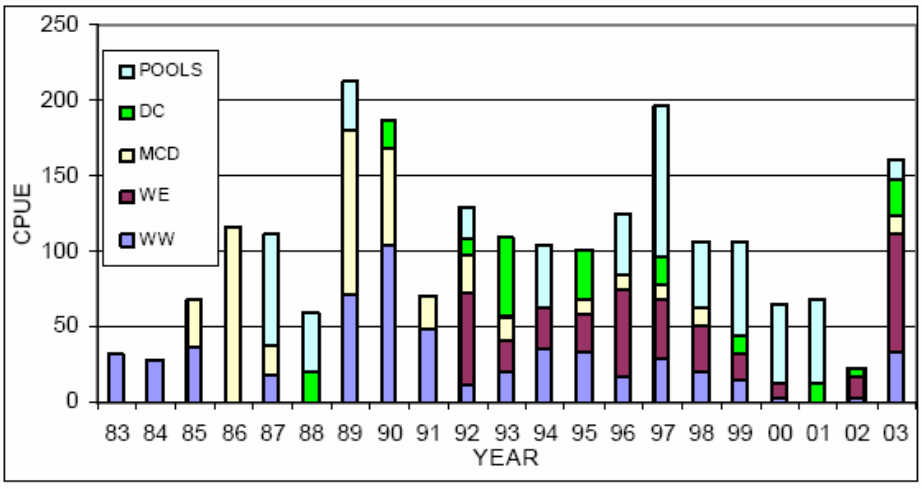

Figure 2. Index of population abundance* for fluvial Arctic grayling in the Big Hole River, Montana. Plot shows CPUE electrofishing of all-aged Arctic grayling from MFWP fall electrofishing surveys in the pools, Deep Creek (DC), McDowell (MCD), Wisdom East (WE), and Wisdom West (WW) sections in the Big Hole River, Montana, from 1983-2003. The comparatively large CPUE value in 2003 represents the contribution of strong recruitment in that year. **A relationship between CPUE and density (e.g., data in Table 1) has not yet been*

established, so it is unknown if the CPUE data presented are correlated to true abundance. Figure adapted from Magee and Lamothe 2004.

Table 1. Estimated density age 1+ (age 1 and older) fluvial Arctic grayling in the Wisdom reach of the upper Big Hole River, Montana, during 1992-present based on MFWP fall electrofishing surveys. Standard deviations of estimates are shown in parentheses. Flows of 20 cfs are considered an absolute minimum survival flow for grayling (Big Hole Watershed Committee [BHWC] 1997; Magee and Lamothe 2003).

YEAR	Age-1+ Arctic Grayling Density (no/mile)	Minimum flows[a] (cfs)	Days <20 cfs[a] Jul-Sep
1992	31 (16)	3.3	32
1993	32 (22)	55	0
1994	65 (50)	1.9	55
1995	70 (62)	31	0
1996	64 (27)	39	0
1997	96 (66)	70	0
1998	76 (30)	45	0
1999	35 (8)	16	5
2000	Not sampled - no estimate[b]	7.3	49
2001	Not sampled - no estimate[b]	6.0	55
2002	Present – no estimate[c]	13	6
2003	Present – no estimate[c]	9.4	61
2004	Present – no estimate[c]	6 (est)	0
2005	N/A[d]	15	14

[a] Big Hole River discharge parameters measured at the U.S. Geological Survey (USGS) gauge 06024450 at Wisdom, Montana (from Table 2 in Magee and Lamothe 2003). Data from 2003-2005 are provisional.

[b] No estimates were made in 2000 and 2001 due to severe low flows.

[c] No quantitative estimate was made in 2002-2004 due to low numbers of grayling captured. Fall abundance or density estimates are based on two-pass electrofishing mark-recapture surveys at specific index or traditional sampling locations in the Big Hole River system (e.g., McDowell and Wisdom). The first pass is used to capture and mark grayling, and the second pass attempts to recapture marked grayling. The abundance estimate is subsequently derived from numbers "marked" during the first pass, and marked (i.e.,"recaptures") and unmarked individuals captured during the second pass. Low captures on the first pass during 2002-2004 made it inadvisable to conduct a second pass, as the potential number of recaptures would be very few, producing an imprecise abundance estimate, or none, resulting in no valid abundance estimate. Thus, MFWP decided to devote this sampling effort elsewhere in the basin (e.g., tributary surveys) or to securing instream flows. Data from 2004 were presented as CPUE, but a relationship between CPUE and density estimates derived by mark-recapture was not provided.

[d] Estimate: data not compiled at time of this writing.

In addition to protecting and maintaining the remnant grayling population in the Big Hole River, a high priority for grayling conservation, and a restoration goal under the Restoration Plan, has been to reestablish populations within the historic range in the upper Missouri River basin (Workgroup 1995; MFWP and Service 1996). Kaya (1992b) evaluated and prioritized sites for efforts to reestablish fluvial grayling populations within the historic range. As of 2004, MFWP has attempted to reintroduce fluvial Arctic grayling in the--1) upper Ruby, 2) Sun (South and North Forks above Gibson Reservoir), 3) lower Beaverhead, 4) Missouri (headwaters),

5) Madison, 6) Gallatin and 7) Jefferson Rivers. At this time, no self-sustaining populations have been reestablished from these efforts (Lamothe and Magee 2004a).
Possible reasons for the failure of these introductions are the persisting drought, the presence of nonnative trout, and the limited number of grayling available to be stocked (i.e, stocking at too low a density to establish a population), and habitat limitations (e.g., Lamothe and Magee 2004a).

The Workgroup decided in February 2003 to focus restoration efforts primarily at the Ruby River site because it seemed to have the best potential for success. This strategy allows grayling from the broodstock to be stocked at this site at higher densities, increasing the likelihood of successful reestablishment if low propagule density is the problem. Limited natural reproduction has been documented in the Ruby River, and stocking locations may be modified to place grayling in closer proximity to suitable overwintering habitat (Lamothe and Magee 2004a). In addition to the Ruby River, restoration activities in 2004 included the Sun, Gallatin, and Madison Rivers, and utilized remote site incubators (Ruby and Sun Rivers) to improve egg survival and increase the number of age-0 grayling released at restoration sites on the Ruby River (e.g., Lamothe and Magee 2004a; Magee et al. 2005). Monitoring indicates that few grayling remain from previous plants in the Sun, Madison and Gallatin Rivers (Magee et al. 2005).

In 1982, the fluvial Arctic grayling was designated as a category 2 candidate for listing under the Endangered Species Act (ESA), as amended. This category (which was eliminated by the Service in 1996) was defined as taxa for which information indicates that proposing to list as endangered or threatened is possibly appropriate, but for which persuasive data on biological vulnerability and threat are not currently available to support a proposed listing rule. In response to a petition to list the grayling as endangered, the Service determined that listing the fluvial Arctic grayling was warranted but precluded by higher priority listing actions in 1994 (59 FR 37738), and as a result it became a category 1 candidate. At that time, fluvial Arctic grayling was given a listing priority number (LNP) 9, reflecting moderate to low magnitude threats that are imminent. This LPN was selected primarily because of the ongoing cooperative prelisting activities to improve habitat conditions in the Big Hole River and to reestablish populations in the historic range reduced the magnitude of the threats. In 2004, the listing priority number of fluvial Arctic grayling was elevated to 3 (69 FR 24881) because the abundance of the remnant population in the Big Hole River declined substantially and the reestablishment efforts had not yet produced self-sustaining populations elsewhere in the upper Missouri River. Cooperative efforts to stabilize the Big Hole River grayling population and restore populations in other streams continue.

DISTINCT POPULATION SEGMENT

Pursuant to the ESA, we must consider for listing any species, subspecies, or, for vertebrates, any distinct population segment (DPS) of these taxa if there is sufficient information to indicate that such action may be warranted. To interpret and implement the DPS provision of the ESA and Congressional guidance, the Service and National Marine Fisheries Service published, on December 21, 1994, a draft "Policy Regarding the Recognition of Distinct Vertebrate Population Segments under the Endangered Species Act" and invited public comments on it (59 FR 65885).

After review of comments and further consideration, the Service adopted the interagency policy as issued in draft form, and published it in the Federal Register on February 7, 1996 (61 FR 4722). This policy addresses the recognition of DPSs for potential listing actions. The policy allows for more refined application of the ESA that better reflects the biological needs of the taxon being considered, and avoids the inclusion of entities that do not require its protective measures. Under the Service's DPS policy, two elements are considered in a decision regarding the recognition of a DPS under the ESA. These are--(1) discreteness of the population segment in relation to the remainder of the taxon, and (2) the significance of the population segment to the taxon to which it belongs.

Under the DPS Policy, a population segment may be considered discrete if it satisfies either one of the following conditions--a) It is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors. Quantitative measures of genetic or morphological discontinuity may provide evidence of this separation; b) It is delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant in light of section 4(a)(1)(D) of the ESA.

If a population segment is determined to be discrete, the Service then considers the available scientific evidence of its significance to the taxon to which it belongs. This consideration may include, but is not limited to--a) persistence of the DPS in an ecological setting unusual or unique for the taxon, b) evidence that loss of the DPS would result in a significant gap in the range of the taxon, c) evidence that the DPS represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range, or d) evidence that the DPS differs markedly from other populations of the species in its genetic characteristics.

SUMMARY OF PREVIOUS FINDING

Fluvial Arctic grayling in Montana were the subject of a status review in 1994 (59 FR 37738), which identified Arctic grayling indigenous to the Big Hole and Madison Rivers as elements of a fluvial DPS in the upper Missouri River. However, this status review occurred prior to the adoption of an official DPS policy by the Service in 1996 (61 FR 4722). In 2004, the Service carefully reviewed the available information concerning the taxonomic status of the species in relation to the Service's 1996 DPS policy and determined that the fluvial Arctic grayling of the upper Missouri River was a valid DPS. This determination was presented in detail in the Service's candidate assessment form for fluvial Arctic grayling dated May 11, 2005 (http://ecos.fws.gov/docs/candforms_pdf/r6/E03Q_V01.pdf). A summary of the key points of this determination follow.

Discreteness:
Arctic grayling native to the upper Missouri River are "markedly separated" because of physical and reproductive isolation. Arctic grayling in the upper Missouri River are reproductively isolated from their nearest conspecifics by at least 800 km (Nelson and Paetz 1991) and have been separated from Arctic Ocean populations for at least 10,000 years (and probably 80,000 years) as a result of glacial activity (Lynch and Vyse 1979; Redenbach and Taylor 1999).

This long period of reproductive isolation coupled with genetic drift and environmental selection pressures has resulted in quantitative genetic differences between Arctic grayling from the Missouri River and elsewhere based on analyses of allozymes and mitochondrial DNA (Lynch and Vyse 1979; Everett and Allendorf 1985; Everett 1986; Redenbach and Taylor 1999; reviewed by Campton and Ardren 2004).

Arctic grayling native to the upper Missouri River exist in two phenotypes or life histories--fluvial (river-dwelling) and adfluvial (spawning in rivers but rearing in lakes). The fluvial form was apparently widespread in the upper Missouri River basin, but the adfluvial form was apparently native only to the Red Rocks Lakes and possible Elk Lake in the headwaters of the Beaverhead River (Kaya 1990). Fluvial and adfluvial Arctic grayling within the upper Missouri River are "markedly separated" from each other as a result of physical and behavioral factors. Extant populations of native fluvial and adflvuial Arctic grayling within the upper Missouri River are reproductively isolated, and the available genetic data are consistent with the hypothesis of two divergent Arctic grayling lineages (fluvial and adfluvial) within the upper Missouri River (see data in Everett 1986; Leary 1990; review by Campton and Ardren 2004).

Thus, the Service concludes that fluvial Arctic grayling of the upper Missouri River are ***discrete*** relative to other examples of the species.

Significance:
Arctic grayling native to the upper Missouri River persist in an "ecological setting unusual or unique for the taxon" and loss of the DPS would result in a "significant gap in the range of the taxon." The upper Missouri River is an "ecological setting unusual or unique" for Arctic grayling. Arctic grayling evolved in Arctic waters. However, the fluvial Arctic grayling of the upper Missouri represent the only natural example of the taxon inhabiting an Atlantic Ocean drainage (via the Missouri and Mississippi Rivers and Gulf of Mexico). All other wild populations of Arctic grayling inhabit drainages of the Arctic Ocean, Hudson Bay, or north Pacific Ocean. Arctic grayling of the upper Missouri River basin are the only extant fluvial grayling population in the contiguous United States, and represent the southernmost extent of the species (Scott and Crossman 1973; Kaya 1990; Campton and Ardren 2004). Thus, loss of this DPS would result in the extirpation of the fluvial form in the contiguous United States and produce "a significant gap" in the fluvial Arctic grayling's range.

Fluvial Arctic grayling in the upper Missouri River "differs markedly from other populations of the species in its genetic characteristics" as indicated by heritable differences in juvenile swimming behavior between it and the native adfluvial form. Experimental data collected under common garden conditions indicates that Arctic grayling from fluvial populations exhibit a lower propensity to move downstream than fry from adfluvial populations (Kaya 1991; Kaya and Jeanes 1995; see review by Campton and Ardren 2004). This genetically-based difference in swimming behavior for fluvial Arctic grayling is consistent with the hypothesis that the fluvial form "differs markedly from other populations [adfluvial populations] of the species in its genetic characteristics."

Thus, the Service concludes that fluvial Arctic grayling of the upper Missouri River are ***significant*** relative to other examples of the species.

Summary:
Because the fluvial Arctic grayling of the upper Missouri River satisfy both the ***discreteness*** and ***significance*** criteria outlined in the Service's DPS policy, the Service concludes the fluvial Arctic grayling of the upper Missouri River constitute a valid DPS∗. After careful review of the available data, the Service is not aware of any new information relevant to the taxonomy of the species that would indicate revision of the existing DPS is warranted.

THREATS

A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range. The majority of the historic range of the upper Missouri River fluvial Arctic grayling DPS has been altered by the construction of dams and reservoirs that created barriers that obstructed migrations to spawning, wintering or feeding areas; inundated grayling habitat; and impacted the historical hydrology of river systems (Kaya 1990). Local land use, particularly in the Big Hole River valley, has affected surface water hydrology, stream morphology, sediment characteristics, vegetation, thermal characteristics, and possibly nutrient inputs. The upper Big Hole River is categorized as impaired under Montana's 303(d) list (http://nris.state.mt.us/wis/environet/2004reports/10020004.pdf).

The predominant land use in the upper Missouri River is agriculture (ranching and cultivation). Diversion of water for irrigation and stock water reduces the amount of in-river grayling habitat. Early-season (April-May) irrigation withdrawals may dewater grayling spawning sites, preventing spawning or causing egg mortality; can prevent juvenile grayling from accessing cover in the vegetation along the shoreline; and may reduce connectivity between necessary spawning, rearing, and refuge habitats. Severe dewatering can reduce habitat volume and may concentrate fish, increasing the probability of intra- and interspecific biotic interactions (competition and predation). There is the potential for grayling, particularly fry and juveniles, to move into irrigation ditches and become stranded when the diversions are shut down without opportunity for them to return to the river, resulting in mortality (Shepard and Oswald 1989). Entrainment of individual Arctic grayling in irrigation ditches is known to occur in the Big Hole River (MFWP et al. 2005), but the overall population-level effect of this entrainment is unknown but possibly significant given the large number of unscreened surface-water diversions in the upper Big Hole River drainage.

Irrigation demands in the Big Hole valley have apparently increased in recent decades resulting from a shift in hay production, where irrigation ceases in mid July, to pasture with an extended irrigation season (Upper Big Hole Total Maximum Daily Load [TMDL] 2003). This shift in local land use also may increase the probability of nutrient loading from irrigation return flow and surface runoff (Upper Big Hole TMDL 2003). Presence of corrals and feedlot areas adjacent to river sidechannels and flood irrigation of pastures with livestock grazing in the upper Big Hole River indicate probable sources of chemical impairment to water quality (DTM Consulting and Applied Geomorphology Consulting 2005).

∗ Note that this determination implies the existence of an adfluvial DPS for Arctic grayling in the upper Missouri River whose status is not being considered in this assessment.

Irrigation and stock water removals during late summer increases water temperatures in the river channel. Summer water temperatures during 2002-04 have exceeded the upper incipient lethal temperature (UILT) for Arctic grayling (e.g., 25°C or 77°F; Lohr et al. 1996) at a number of monitoring stations throughout the Big Hole River (Magee and Lamothe 2003, 2004; Magee et al. 2005). The UILT is the temperature that is survivable indefinitely (for periods longer than 1 week) by 50 percent of the "test population" in an experimental setting. During mid-July 2004, water temperatures exceeded 25°C in a core spawning and juvenile rearing area for fluvial Arctic grayling in the mainstem Big Hole River near Wisdom, Montana (temperature data: USGS stream gauge 06024450, www.waterdata/usgs.gov; spawning/rearing locations Magee and Lamothe 2003). Water temperatures in 2004 exceeded levels thought to be stressful for salmonids at all mainstem river monitoring locations (e.g., 21°C or 70°F, Magee and Lamothe 2003; Magee et al. 2005). Human influences on elevated water temperatures such as those observed in the Big Hole River result from a combination of reduced streamflows (irrigation diversions), loss of riparian vegetation (reduced shading), channel widening, and irrigation return flows (e.g., upper Big Hole TMDL 2003; Confluence Consulting 2005a, b; DTM Consulting and Applied Geomorphology Consulting 2005).

Healthy riparian corridors are important for maintaining instream habitat for Arctic grayling in the upper Missouri River basin, and in general are critical for the ecological function of aquatic systems (Gregory et al. 1991). Riparian zones are judged important for grayling because of their effect on water quality and role in creating and maintaining physical habitat features (e.g., pools) utilized by grayling. Removal of willows and riparian clearing along the Big Hole River has apparently accelerated in recent decades, and, in conjunction with streamside cattle grazing, has led to localized bank erosion and channel instability (Upper Big Hole TMDL 2003). Grayling abundance in historical survey reaches in the upper Big Hole River was positively related to the presence of overhanging vegetation, primarily willows, which was associated with pool habitat (Lamothe and Magee 2004b). Simplification and degradation of riparian habitat in the upper Big Hole River has led to a shift in channel form from multiple threads to single wide channel, increased erosion rates, reduced cover, increased water temperatures and less woody debris recruitment (e.g., Upper Big Hole TMDL 2003).

Sections of the Madison River, including Ennis Reservoir, are considered impaired under Montana's 303(d) list, with causes of impairment attributed to factors like flow alteration and dewatering, siltation, bank erosion, contaminants and metals, thermal modifications, and riparian habitat degradation (>http://nris.state.mt.us/wis/environet/2004reports/10020007.pdf<). A specific additional threat for Arctic grayling in the Madison River is hydromodification of habitat from the presence and operation of Ennis Dam, a run-of-the-river dam that impounds Ennis Reservoir.

A population crash of Arctic grayling coincided with a reservoir drawdown in winter 1982-83 (Byorth and Shepard 1990). This drawdown likely affected the forage base, rearing habitat, and spawning cycle of Arctic grayling in the reservoir. The Ennis Dam is a migration barrier, with no fish passage facilities. Anglers encounter Arctic grayling in pools below the dam, implying that fish occasionally pass (downstream) over or through the dam (B. Mabbott, Montana PPL, pers. comm.). These fish would be "lost" to the population because they cannot return upstream and have apparently not established populations downstream.

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes.
Arctic grayling in the upper Big Hole River are handled for recreational and scientific purposes, but these activities are curtailed when environmental conditions become too stressful for the fish. Arctic grayling are easily caught by anglers and intense angling pressure can reduce densities and influence the demography of exploited populations (e.g., Northcote 1993 and references therein). Historical angling exploitation likely contributed to, or initiated past declines or local extirpations throughout the upper Missouri River DPS (Vincent 1962). Currently, catch-and-release regulations are in effect for grayling in rivers in Montana to reduce mortality from recreational fishing. Some Arctic grayling stocks appear to be somewhat resistant to repeated hooking (e.g., Clark 1991) but effects of angling and handling may be stock specific. All angling is closed on the Big Hole during periods of severe drought (BHWC 1997). The MFWP closed angling in the upper Big Hole River from May 21-November 30 because of low spring streamflows and projected environmental conditions (Magee et al. 2005).

Population monitoring efforts conducted by MFWP are curtailed during severe drought (Magee 2002). The Ennis Reservoir and the adjacent Madison River support popular sport fisheries, primarily for nonnative trout, and Arctic grayling are occasionally captured (Byorth and Shepard 1990). Overall, the available data do not support the conclusion that overutilization poses a significant threat to fluvial Arctic grayling.

C. Disease or Predation.
Arctic grayling are resistant to whirling disease, which is responsible in population-level declines of other stream salmonids (Hedrick et al. 1999). However, they are susceptible to bacterial kidney disease (P. Magee, MFWP, unpublished data). Further information is needed to address the overall threat of disease to the upper Missouri River Arctic grayling DPS.

Predation and/or competition with Arctic grayling by non-native trout are thought to be factors limiting fluvial Arctic grayling populations (Kaya 1992b) and likely affect the success of reestablishment efforts. Non-native brook trout (*Salvelinus fontinalis*), rainbow trout (*Oncorhynchus mykiss*), and brown trout (*Salmo trutta*) are well-established with locally abundant populations throughout the upper Missouri River drainage. Research on competition between grayling and non-native brook trout found little evidence that brook trout negatively affected microhabitat use or growth of juvenile (age-1) hatchery-reared Arctic grayling (Byorth and Magee 1998). However, further studies are necessary to determine whether competition or predation occur at other life stages or with brown or rainbow trout. Overall, the decline of grayling coincident with encroachment by nonnative trout (Vincent 1962; Kaya 1990, 1992a, 2000), and the difficulty in reestablishing grayling populations where nonnatives are present (Kaya 1992b) provide circumstantial evidence of biotic effects from nonnatives.

Predatory birds may eat Arctic grayling, but data demonstrating predation and population level effects on grayling are lacking. Piscivorous American white pelican (*Pelecanus erythrorhynchos*) are present in the Big Hole River valley. These pelicans are effective shallow-water fish predators (Findholt and Anderson 1995), but there are currently no data demonstrating predation on Arctic grayling in the Big Hole River. The Service issued a scientific collection permit to MFWP in summer 2004 for the purpose of collecting such data,

but the Service is not aware of any data collected under the permit.

D. The Inadequacy of Existing Regulatory Mechanisms.
The State of Montana considers the fluvial Arctic grayling to be a Species of Special Concern (http://www.fwp.state.mt.us/fieldguide/detail_AFCHA07011.aspx). However, most of the upper Missouri River and its major tributaries are managed to produce abundant, large, non-native trout to support recreational fisheries. Such management may affect fluvial Arctic grayling restoration efforts if grayling populations are negatively affected by interactions with non-native fish. The MFWP altered some its regulations in the Big Hole River to be more compatible with grayling restoration by removing some restrictions that encouraged the growth of large non-native trout, and increasing possession limits for nonnative brook trout.

The upper Big Hole River (including some tributaries) and sections of the Madison River (including Ennis Reservoir) are included on the State of Montana's 303(d) list of impaired water bodies. Montana Department of Environmental Quality (MDEQ) has a target date of 2011-13 and 2011 to complete TMDL assessments in the upper Big Hole and upper/middle Madison Rivers, respectively (http://nris.state.mt.us/wis/TMDLApp/pdf2002/Appendix_E.xls). The TMDL assessment has been partially completed in the upper Big Hole River (e.g., Phase 1 - Upper Big Hole TMDL 2003), and draft reports summarizing the data and suggesting TMDL await finalization (e.g., Cofluence Consulting 2005a, b).

E. Other Natural or Manmade Factors Affecting Its Continued Existence.
Drought is a significant threat to the well-being of fluvial Arctic grayling populations in the upper Missouri River basin. Southwestern Montana has experienced a severe drought since 1999 which has exacerbated the impacts of water withdrawals in the upper Missouri and Big Hole River basin. Reductions in populations of fluvial Arctic grayling and nonnative trout in the Big Hole River appear to coincide with periods of drought (Magee and Lamothe 2003, 2004). Widespread drought conditions have likely hampered fluvial Arctic grayling restoration efforts in upper Missouri River basin (Lamothe and Magee 2004a).

Climate change is predicted to result in habitat loss and fragmentation for salmonid species in the Rocky Mountains (Keleher and Rahel 1996), and should place further thermal constraints on grayling in the Big Hole River (Lohr et al. 1996) if other habitat conditions do not improve.

Fluvial Arctic grayling in the Big Hole River (and Madison River) are possibly subject to environmental and genetic problems that threaten many small populations. The importance of demographic uncertainty, environmental uncertainty, natural catastrophes, and genetic uncertainty on population dynamics all increase with decreasing population size (Shaffer 1987). Thus, effects from random survival and reproduction of individuals (demographic uncertainty); variation in climate, food resources, competitors, parasites (environmental uncertainty); random occurrence of floods and drought (natural catastrophes); and genetic drift (genetic uncertainly) may threaten the long-term persistence of this population.

CONSERVATION MEASURES PLANNED OR IMPLEMENTED

Drought Response

The Big Hole Watershed Drought Management Plan was implemented during the last five summers (i.e., 2000-05). These efforts included angling closures and voluntary closures of irrigation diversions in certain river reaches. Additionally, a Flow Enhancement Program has been in place since 1994 to provide alternative water sources, such as stock water wells, so that landowners do not have to divert water from the Big Hole River and its tributaries. In 2004, the Natural Resources Conservation Service (NRCS) sponsored a special initiative Environmental Quality Incentives Program (EQIP) to provide incentives to landowners for restricting irrigation, operating off-stream livestock watering facilities, and fencing riparian zones. This program resulted in 14,491 acres of deferred irrigation and construction of 12 off-channel stock watering facilities. The 2004 EQIP program, in conjunction with timely precipitation and voluntary water conservation measures by additional landowners, helped to maintain summer 2004 flows in upper Big Hole River at or near the median value for the 16-year period of record during July-October. In 2005, MFWP worked with interested landowners to coordinate irrigation diversions so that adequate instream flows were provided given below average snowpack. The BHWC and Trout Unlimited helped fund a position ("ditch rider") to implement these actions.

However, as previously noted, recent land use changes in the Big Hole River valley have likely increased irrigation demands, making an equitable long-term solution for the various water uses (e.g., agriculture, instream flow, etc) imperative to secure adequate grayling habitat.

Longer-Term Solutions to Water Use Conflicts and Habitat Degradation in the Big Hole River

In April 2005, MFWP applied for an ESA section 10 enhancement of survival permit for a Candidate Conservation Agreement with Assurances (CCAA) to benefit fluvial Arctic grayling in the upper Big Hole River. The four main goals of this 20-year CCAA are to--improve instream flows, protect and restore riparian habitats, identify and reduce entrainment threats, and remove human-made barriers to migration and dispersal. The Service is in the process of evaluating this application and the draft CCAA. Interest in the CCAA appears significant, as over three dozen landowners (representing over 200,000 acres) expressed written intent to participate in the CCAA if it were approved (MFWP et al. 2005). These same landowners have been actively cooperating with MFWP and its CCAA partner agencies (NRCS, Montana Department of Natural Resources and Conservation [MDNRC], and the Service) to implement measures that will improve streamflows and habitat conditions for grayling. In 2005 and in coordination with the above activities, NRCS committed approximately $500,000 to provide technical and financial assistance to producers in the upper Big Hole River watershed upstream of Dickie Bridge who install conservation practices in a continuing effort to benefit fluvial Arctic grayling habitat. The 2005 EQIP program focuses primarily on improving the management of irrigation water through the installation of water control structures and measuring devices, and providing grayling passage past irrigation diversion structures. This program has resulted in 17 contracts to replace or repair 64 headgates and 50 diversion structures and install 52 flow measuring devices (Kris Berg, NRCS, Dillon, Montana, pers. comm.).

Other Ongoing Conservation Actions

The BHWC has established a Habitat Restoration Working Group to prioritize grayling-oriented restoration projects in the Big Hole River. Funds from BHWC have been allocated for a channel restoration project in the lower reaches of Lamarche Creek. The MFWP has initiated a number of habitat improvement projects to benefit grayling since 2003, including revegetation of riparian

areas and fencing of stream banks was conducted along Deep, LaMarche, and Steel Creeks; creation of 8 pools in lower Fishtrap Creek; and installation of a fish ladder on a diversion

structure in the North Fork of the Big Hole River (Magee and Lamothe 2004). The MDNRC continues to monitor streamflows in the Big Hole River basin and provide an assessment of ongoing water conservation measures (Roberts 2005).

SUMMARY OF THREATS

The current range of fluvial Arctic grayling has been reduced to approximately 5 percent of its historic level by combined effects of dams, habitat degradation and fragmentation, overfishing and encroachment by nonnative fishes. The remnant fluvial Arctic grayling population in the Big Hole River is threatened by habitat loss, fragmentation, and degradation caused by hydrologic alterations and stream dewatering from irrigation withdrawals, thermal loading, loss of riparian habitat, and cross-channel irrigation diversion structures that blocks migration and dispersal; drought; entrainment in irrigation ditches; and encroachment by nonnative trout species (especially brown trout).

LISTING PRIORITY

THREAT			
MAGNITUDE	IMMEDIACY	TAXONOMY	PRIORITY
High	**Imminent**	Monotypic genus	1
		Species	2
		Subspecies/population	**3***
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	6
Moderate to Low	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

RATIONALE FOR LISTING PRIORITY NUMBER

We recommend the priority listing number for the fluvial Arctic grayling upper Missouri River DPS remain at 3 because the threat to the confirmed remaining population in the Big Hole River remains high in magnitude and imminent. Despite progress made with ongoing cooperative efforts to improve flow conditions in the Big Hole River, the location of lone remaining self-sustaining fluvial Arctic grayling population in the DPS, grayling remain at very low abundance and reproduction has been inconsistent at best during the past 6 years. Ennis Reservoir/Madison River Arctic grayling also exist at very low abundance and may no longer represent a viable population. The development of a CCAA to benefit fluvial Arctic grayling in the Big Hole River is a positive step toward conserving the species, but will take a number of years (presuming it is executed) to result in measurable improvements to the population and does

not address the status of fluvial Arctic grayling elsewhere in its historic range in the upper Missouri River. Widespread drought conditions are a persistent threat to the fluvial Arctic grayling in the Big Hole River and have likely hampered efforts to re-establish additional self-sustaining populations of fluvial Arctic grayling elsewhere in the historic range of the upper Missouri River DPS. These restoration efforts are considered vital for the persistence of the species. The risk of a natural catastrophic or human-caused event leading to extinction of the species is very high when the there is no population redundancy (i.e., only a single confirmed fluvial population) for the conservation unit.

Magnitude: The magnitude of the threat to the fluvial Arctic grayling upper Missouri River DPS remains high because of low population abundance, ongoing drought conditions, compromised physical habitat, and absence of additional self-sustaining (and viable) fluvial populations. Overall, the threats to the DPS are widespread and affect the entire range of the extant fluvial Arctic grayling population in the Big Hole River.

The fluvial Arctic grayling once ranged throughout the upper Missouri River drainage but now the only confirmed remnant fluvial population is restricted to the upper Big Hole River, an area estimated to be about five percent of its historic range. Low numbers of recent grayling captures at index reaches in the Big Hole River indicate a general downward trend in grayling abundance, especially for adult age classes, but recruitment by age-0 grayling was strong in 2003 and moderate in 2004 which indicates the population remains viable at this time.

Sporadic or low recruitment in 4 of the past 6 years has resulted in a demographically unbalanced population structure, with the majority of individuals in the age-0 and age-1 classes which are not reproductively mature. Persistent drought conditions, coupled with high water temperatures, have been a major impediment in efforts to improve habitat conditions and fluvial Arctic grayling abundance in the Big Hole River. Arctic grayling in the Big Hole River apparently seek refuge in the lower reaches of tributary streams during periods of thermal stress, as individuals of various age classes have consistently been encountered there in recent years. Abundance of spawning Arctic grayling in the Madison River is very low, indicating that population is vulnerable and perhaps no longer viable.

Efforts to reestablish grayling populations within the upper Missouri River basin DPS began in 1997. At this time, there is no evidence that these efforts have been successful in reestablishing self-sustaining fluvial populations. Restoration efforts this past year have focused primarily on the Sun and Ruby Rivers, and have utilized remote site incubators (in-stream structures which protect fertilized eggs) to improve egg-to-fry survival. One positive sign is that natural reproduction has been observed in the Ruby River; however, comparable results must be observed over a number of years to establish that this represents a viable self-sustaining population.

Thus, the magnitude of the threat remains high because the remnant fluvial Arctic grayling populations of the upper Missouri River DPS (i.e., Big Hole River and Ennis Reservoir/Madison River populations) remain at very low abundance and the entire population remains at risk from habitat degradation and fragmentation and encroachment by nonnative trout. The Ennis

Reservoir-Madison River population may no longer be viable given low abundance and little evidence of recent recruitment. Drought continues to affect these populations and to hamper efforts to establish fluvial Arctic grayling elsewhere in the upper Missouri River basin.

Imminence: The threats to the fluvial Arctic grayling of the upper Missouri River DPS are imminent. Drought conditions since 1999 have increased water temperatures, reduced flows, and exacerbated the effects of ongoing threats such as flow reductions from irrigation and stock water withdrawals. These factors have resulted in locally degraded habitat conditions, the potential for mortality in adult fluvial Arctic grayling from thermal stress, and low recruitment levels for Big Hole River grayling in 4 of the past 6 years. The potential for competition with or predation by non-native fish is a persistent concern. These conditions are not only a threat to grayling in the Big Hole River, the last native self-sustaining confirmed fluvial Arctic grayling population of the upper Missouri River basin, but also likely affect the a remnant grayling population in Ennis Reservoir/Madison River (putatively fluvial, but perhaps no longer viable) and have compromised attempts to establish additional fluvial Arctic grayling populations in the native range of the DPS.

Cooperative, community-based efforts have focused primarily on working with water users to leave water in the Big Hole River to increase flows and reduce water temperatures during periods of drought. Low snowpack has produced lower-than-average water availability, so despite these efforts there continues to be periods when actual streamflows at Wisdom flows are below those considered "survival" flows for grayling and water temperatures have exceed the UILT of grayling in some locations at some point during each of the last five summers. Based on recent grayling population surveys, these water conservation efforts do not appear to have been adequate to maintain the grayling population at the density levels or population age structure established in the agreement between MFWP and the Service. The Service is not aware of any specific conservation efforts currently underway to stabilize or enhance the remnant grayling population in Ennis Reservoir/Madison River.

Overall, threats to fluvial Arctic grayling are ongoing and expected to remain so in the absence of active measures to restore aquatic and riparian habitats, improve instream flows, and reduce habitat fragmentation in the Big Hole River. These types of efforts are planned (e.g, CCAA), but have not yet been fully implemented so the threats remain imminent. Threats from encroachment by nonnative trout, especially brown trout, remain imminent based their populations are sympatric (overlapping) or adjacent to grayling in the Big Hole River.

RATIONALE FOR CHANGE IN LISTING PRIORITY NUMBER

_X_ Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed?

Is Emergency Listing Warranted? No. The Service has carefully and promptly reviewed the available information and monitored the status of the species during 2005, and determined that emergency listing of the upper Missouri River fluvial Arctic grayling DPS is not necessary at this time. Poor snowpack conditions from winter 2004-05 resulted in forecasts for extremely

lows in the Big Hole River during spring and summer 2005. While flows remained below the long-term average because of overall low water availability, the Service has concluded they did not decrease to the level constituting an emergency for the resident grayling population. Streamflows in the Big Hole River at Wisdom during grayling spawning were comparatively better in 2005 compared with 2004. Better than anticipated streamflows are attributed to above-average early summer precipitation and voluntary participation of ranchers in irrigation reduction efforts coordinated by MFWP. Although the Arctic grayling population does remain at low abundance, successful recruitment in 2003 and 2004 indicates the population can still reproduce under less than ideal environmental conditions.

DESCRIPTION OF MONITORING

The MFWP has systematically monitored the Arctic grayling population in the Big Hole River since 1983 using snorkeling and electrofishing, except in situations where low flows and high water temperatures precluded sampling. The MFWP also monitors the results of fluvial grayling reintroduction efforts in the upper Missouri River basin. The MFWP provides the Service with annual data reports based on the years' results, and Service staff are in frequent contact with state fishery biologists and obtain up-to-date information through formal and informal meetings, telephone and e-mail.

The Service participates in the Workgroup which meets annually and provides a formal venue for State, Service, and academia to discuss population status and prioritize restoration efforts for fluvial Arctic grayling. Staff from the Service's Montana Field Office staff frequently attend BHWC meetings and have participated in that organization's Habitat Restoration Planning Group.

The Service, along with MDNRC and NRCS, has participated in MFWP's effort to develop a CCAA to benefit fluvial Arctic grayling in the Big Hole River. This ongoing process necessitated numerous formal and informal meetings to facilitate the exchange of information between staff of various agencies during project planning.

Overall, the cumulative count of individual contacts between the Service's Montana Field Office staff and representatives from State and Federal agencies and non-governmental organizations who are stakeholders in fluvial Arctic grayling conservation has numbered in the dozens during 2005. The Service has remained in frequent contact with those who physically collect the population status data for fluvial Arctic grayling in the Big Hole River, and continually monitors the peer review literature for additional relevant information.

COORDINATION WITH STATES

On September 14, 2005, the Service contacted MFWP's two grayling Arctic grayling biologists, "officially" requesting species assessment information for fluvial Arctic grayling and providing the opportunity to comment on the existing candidate assessment. The MFWP provided an updated annual report summarizing monitoring data collected during the 2004 field season. No comments were provided on the existing candidate assessment form. The MFWP staff have remained responsive to the Service's frequent inquiries and have always provided pertinent

information upon request as it becomes available. Monitoring data from 2005 are still being collected and are thus unavailable at the time of this assessment.

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APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions, or removal of species from candidate status, and listing priority changes.

Approve: Sharon Rose 11/4/2005

Acting Regional Director, Fish and Wildlife Service Date

Concur: August 23, 2006

Director, Fish and Wildlife Service Date

Do not concur: _____

Director, Fish and Wildlife Service Date